

dictions, but as Mr. Chaffee remarks in another column nothing will replace the careful study of the morning weather map whenever that is accessible. Every one should familiarize himself with the typical conditions shown on the maps in order to anticipate severe frosts, floods, gales, and other calamities.

THE DEPTH OF ATMOSPHERIC COLD WAVES.

By means of the kite we shall, undoubtedly, eventually ascertain the depth of the layers of cold air that flow southward over the Mississippi Valley. Meanwhile, we may bear in mind that ever since the establishment of the Weather Bureau stations at Cheyenne and Santa Fe, in 1870 and 1871, it has been well known that most of these cold waves are very shallow. In his February report Mr. F. H. Brandenburg, section director for Colorado, says that the cold waves for this month do not appear to have extended to a great height, since the mean temperature of the plains region was lower than that of the adjacent mountain districts, which are five or six thousand feet higher. The latter regions were usually cloudy with an abnormal and unparalleled amount of snow, while the plains were relatively clear and subject to intense radiation. The average depth of total snowfall for the month is said to be 33 inches in the valleys, 66 inches at timber line, and 76 at higher elevations in the mountain region of Colorado. It is expected that many of the snowdrifts will last all summer, and there will, of course, be an abundance of water for irrigation.

THE BENEFITS OF SEVERE WINTERS.

Mr. J. B. Marbury, section director for Georgia, states that in many respects the severe weather of February was most beneficial to the farmer. The freezing and thawing greatly improved the condition of the soil. The land was softened and pulverized more thoroughly than long-continued plowing could have done; much natural plant food was rendered available for the next growing season; millions of injurious insects were killed. Many are already predicting a splendid crop year.

WEATHER VERSUS CLIMATE.

It is commonly said that the climate is the average weather of a century or some long period of time; that the climate represents normal or average conditions, while the weather is the temporary condition prevailing at any moment. Statistics have been compiled to show some of the relations between the average crops and the average climate. The present Editor has undertaken extensive works in this line, but summed it all up by saying that for crops raised out of doors the relation is too complex to present any results of positive value to either the farmer or the biologist. The fact is that the innumerable combinations between the varying conditions of weather, soil, and plant will, at any stage of growth, affect the plant and crop to an important extent. It is the weather and not the climate that is of importance to the farmer. The weather is everything, the climate is an abstract idea that has very little interest for him. For example, Mr. C. F. R. Wapenhans, Section Director for Indiana, states in his February Report that where the wheat was well protected by snow, the exceedingly cold weather did but very little injury, whereas in the northern portion of the State where but little snow had fallen, many fields appeared to be injured. In some places, although the top of the plant looks brown and dead, yet it is still green lower down near the surface of the ground. Such illustration might be cited for every variety of plant in every variety of location. It is the combination of the weather with

peculiarities of the soil and plant that produces favorable or unfavorable conditions. Plants are sometimes injured in the Southern States by a cold wave because the preceding warm weather had developed them rapidly, while on the same date those in northern regions escaped uninjured because the steady cold weather had retarded their development.

Most of our fruits and grains are being cultivated in regions that are far removed from their native habitats. We have spread all over the United States the peaches that came from Persia, the corn from central Mexico, the wheat from Egypt and India, and so on indefinitely. The success in raising profitable crops in any part of the country must depend upon the frequency with which injurious weather conditions recur. A favorable locality is not one whose average climate is favorable, but one in which the extreme severities of the weather do not recur too often. The cultivation of peaches, oranges, grapes, and other fruits whose plants require five or ten years to mature, may be profitable if killing weather does not recur oftener than once in ten or twenty years. Tobacco and cotton and the grains that must be started annually, may be cultivated profitably if bad seasons do not recur oftener than once in five years.

We would invite our readers to review carefully their own personal knowledge of local crops in their respective districts and communicate to us a statement as to the dates and manner in which any given plant or crop was injured by the weather at any time during the past ten years. When a cold spell occurs it is commonly stated that this has destroyed the peaches or the corn, or has injured the tobacco, etc., but these statements are often mere guess work. We believe them implicitly at the time, and yet the resulting crop turns out about as usual, showing that our judgment was quite erroneous. As a rule, during the months succeeding a disastrous freeze, Nature does her best to repair the damage, and often succeeds to a surprising extent. The plant has within it what may be called a power to struggle against adversity and to accomplish a crop if this be not entirely impossible.

We commend to all the careful study of the true relation between the weather and any given crop, and a determination of the relative frequency of good, average, and poor years.

EXPERIMENTS IN PROTECTION FROM FROST.

In the February report of the Louisiana section Mr. Alexander G. McAdie, who is about to return to San Francisco, Cal., gives some account of the extensive system of experiments undertaken at Woodland, near Diamond, La., as a study of methods of protection against frost. It seems that the orange grower in Louisiana is concerned only with the protection of the tree during the months of January and February, for the fruit itself has never yet been injured by frost. The cold weather of February, 1895, destroyed nearly all the orange trees except in the extreme southern portion of the State, not more than 60 miles from the mouth of the Mississippi. On the other hand, the experiments at Woodland, which is about 43 miles south of New Orleans and about 20 miles north of the limit just given, have shown that by flooding the whole orchard at any time the injuries produced by ordinary freezes may be averted. Possibly the freeze of February, 1895, could have been thus nullified, but the still more severe freeze of February, 1899, demanded extra precautions. In addition to the flooding there were tried smudges and matting and hilling up the earth around the trees. The injury done by the freeze of this current month was aggravated by the fact that the extremely warm weather of the 3d, 4th, and 5th of February had started the sap and forced the growth so that the trees were killed or badly injured by the freeze of February 12-13, except in the section where the